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CENTERING CURRENT SUPPLY

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DIVISION CAMDEN, N. J.

IB-36249-1

CENTERING CURRENT SUPPLY

MI-40839

INSTRUCTIONS

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DIVISION
Camden 2, New Jersey, U. S. A.

Printed in U. S. A.

IB-36249-1

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TECHNICAL SUMMARY

ELECTRICAL SPECIFICATIONS

Input Voltage	95 to 135 volts a-c, 60 cycle, 1 phase
Input Current	0.64 amp. min. 0.95 amp. max.
Input Power	31 watts min. (with 8 volt 1.2 amp d-c output; 95 volt a-c input). 52.5 watts max (with 10 volt 1.5 amp d-c output; 135 volt a-c input).
Output	9 volts d-c (adjustable ±1 volt) at 1.2 amp. nominal (1.5 amp max.).
	Ripple not more than 0.35% (0.028 volt peak-to-peak).
Regulation	0.35% max. during line surges.
	0.35% max. drift over 8-hour period.
	1% max. for repeat operation (off-on cycling).

MECHANICAL SPECIFICATIONS

Width	Standard 19 inch rack
Height (rack space)	5-1/4 inches
Depth	9-3/4 inches
Weight	22 pounds approx.

DESCRIPTION

GENERAL

The RCA MI-40839 Centering Current Supply, shown in outline in Figure 1, has been designed to provide centering current for the three deflection yokes in the RCA Type TK-41 Color Television Camera. Metallic rectifiers are used in conjunction with a self-saturating magnetic amplifier and a tubeless control circuit to obtain regulated d-c output current.

CIRCUIT DESCRIPTION

The schematic diagram of this unit is shown in Figure 2. Functioning of the circuit is as follows:

Transformer T2, the self-saturating reactor T1, and the associated rectifiers, SR1, comprise the power circuit. The SR1 rectifier is connected in a single-phase bridge circuit with two arms connected through coils in reactor T1. D-c output from the rectifier is then filtered by chokes L1, L2, and capacitors C1, C2, C3.

A detailed explanation of the theory of the magnetic amplifier and regulator circuits is beyond the scope of this instruction book. In simple terms, however, the a-c coils on the reactor may be considered to act as gates which open at some time during the half cycle in which rectifier SR1 allows conduction. Until the gate opens, no current flows. After the gate opens, the current flow is restricted only by the impedance of the load circuit. Thus, the average current and hence the voltage is determined by the fraction of the half-cycle period that the gate is open.

For example, if the input voltage is reduced, the current flow during the conducting period will be reduced. In this case, therefore, the gate must be opened earlier to maintain the same output voltage.

Opening of the gate is controlled by the current in the d-c windings of reactor T1. Adding control ampere turns with the same polarity as the power ampere turns will increase the output, and conversely, reducing the control ampere turns will decrease the output.

Three independent sources of compensating current are provided to correct for variations in line voltage, load current, and output voltage. Two windings on reactor T1 apply a-c to rectifier SR2 which develops a proportional d-c controlling current. This current is applied to a pair of windings on reactor T1 and, since it varies with a-c line voltage, will compensate for line voltage irregularities.

Load current flows through filter chokes L1 and L2 thereby developing a d-c voltage across the filter proportional to the current. This voltage is applied to a second pair of windings on T1 for load current compensation.

Output voltage is applied to a bridge network which includes resistors R2, R3, R4, R5, R6, and a silicon diode CR1. The voltage drop across CR1 remains constant at approximately 4 volts regardless of variations in current flow through it. This voltage is applied to one end of the regulating winding on T1. The voltage across resistors R4, R5, and R6 will vary directly with the output voltage and the voltage at the movable arm of R5 is applied to the other end of the regulating winding.

The current flowing through the regulating winding due to the difference between the applied voltages will, therefore, compensate for variations in the output voltage.

INSTALLATION

The MI-40839 Centering Current Supply should be mounted in the rack which contains the power supplies for the camera. Power connections should be made as follows to jack J1 on the rear of the chassis:

7	117 volts 60 cycles
8	117 volts 60 cycles
10	-9 volts d-c
11	+9 volts d-c
12	Connect to system ground.

OPERATION

Close switch S1 which applies a-c power to the unit. Connect a d-c voltmeter to test jacks J2 (+) and J3 (-) then adjust the CENTERING CURRENT ADJ control, R5, to give the required 9 volt output. Lock the control shaft to prevent accidental change, then disconnect the test meter.

Note that R5 provides an adjustment range of ±1 volt from the 9 volt center value, with an output current of 1.5. Refer to the Technical Summary for complete specifications.

MAINTENANCE

GENERAL

This equipment requires no maintenance other than periodic cleaning of dust from circuit components. Rectifier stacks especially must be cleaned of any dust accumulation which would restrict flow of cooling air and thereby cause rectifier overheating and shortened life.

An air blast or soft brush may be used for cleaning rectifier stacks. Be careful, however, to avoid any damage to components.

If fuse F1 should blow, replace it with a similar 1.5 ampere fuse. Do not under any circumstances use a fuse with higher current rating. Certain factory adjustments in this equipment are critical and should not be disturbed. These adjustments are identified on the Schematic Diagram, Figure 2.

ADJUSTMENT OF T2

The secondary winding of T2 is tapped to provide outputs of 28 or 32 volts. The unit has been connected to provide the correct voltage for a regulated output of 9 volts at J1. Should it be necessary to change some of the components, it may be found that due to changes in tolerance of the new components the unit will not provide the regulated output of 9 volts. In this case, change the connection to terminals A or B of T1 as necessary.

TROUBLE SHOOTING

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. OBSERVE SAFETY PRECAUTIONS WHILE WORKING ON THE UNIT.

Typical circuit voltages and currents including the directions of current flow are indicated on the Schematic Diagram, Figure 2. All voltage measurements should be taken with a VoltOhmyst or similar high resistance meter. All current readings should be taken with a meter having as low a resistance as possible.

The following table lists various troubles and their possible causes.

SYMPTOM	POSSIBLE CAUSE	CHECK
No output voltage	Open power circuit	Test for an open circuit in one of the following components: ON-OFF switch, fuse, primary and secondary of transformer T2, a-c windings of reactor T1, rectifier SR1, Chokes L1 and L2.
High or low output voltage	This is probably due to failure of the sensing element or failure of the control reactor circuit	Check the voltage across regulator crystal CR1. Be sure crystal is installed with proper polarity (dots must match).
Low output voltage	Control reactor circuit	Determine if voltage is being applied to the reactor control circuit. Check current in the reactor windings. Low output is due to no current or low current which may be caused by an open rectifier, or open a-c coils on T1.
High output voltage	Control reactor circuit	Excessive output current which may be caused by an open d-c winding, or an open circuit between the d-c winding and the regulating bridge circuit.
Excessive ripple	Failure of one or more of the electrolytic capacitors	Check the ripple voltage across C1. If it is normal or lower, failure is in the output bank, C2, C3. If ripple is high across C1, failure is in C1.

REPLACEMENT PARTS AND ENGINEERING SERVICE

When ordering replacement parts, please give symbol, description, and stock number of each item ordered.

The part which will be supplied against an order for a replacement item may not be an exact duplicate of the original part. However, it will be a satisfactory replacement differing only in minor mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment.

The following tabulations list service parts, electron tube, and field engineering service ordering instructions according to the geographical location of the station.

SERVICE PARTS

STATION LOCATION	OBTAIN SERVICE PARTS FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative, his office, or directly from the Service Parts Order Service, Bldg.60, 19th and Federal Streets, Camden 5, N. J. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg.60, Camden, N.J. (Telephone: Woodlawn 3-8000).
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Broadcast Equipment Sales Representative, or Service Parts Order Service, RCA International Division, Gloucester, New Jersey. U.S.A.

ELECTRON TUBES

STATION LOCATION	OBTAIN ELECTRON TUBES FROM
Continental United States or Alaska	Local Distributor or nearest of the following warehouses: 34 Exchange Place Jersey City 2, New Jersey 589 E. Illinois Street Chicago 11, Illinois 420 S. San Pedro Street Los Angeles 13, California
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York. U.S.A.

If for any reason, it is desired to return tubes, please return them to the place of purchase. If this is not convenient, please notify your RCA serving warehouse so that Return Authorization may be forwarded to you.

PLEASE DO NOT RETURN TUBES DIRECTLY TO RCA WITHOUT AUTHORIZATION AND SHIPPING INSTRUCTIONS.

It is important that complete information regarding each tube (including type, serial number, hours of service and reason for its return) be given.

When tubes are returned, they should be shipped to the address specified on the Return Authorization form. A copy of the Return Authorization and also a Service Report for each tube should be packed with the tubes.

FIELD ENGINEERING SERVICE*

STATION LOCATION	REQUEST FIELD ENGINEERING SERVICE FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative or the RCA Service Company, Inc., Broadcast Communications Service Division, Camden, N.J. Telephone: Woodlawn 3-8000.
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Chief Engineer RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

**Charges for field engineering service will be made at current rates.*

PARTS LIST

For ordering information see page 8

CENTERING CURRENT SUPPLY, MI-40839

SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
C1 to C3	Capacitor: electrolytic, 3000 mf, 15 v	8908550-1	208790
CR1	Rectifier: silicon diode	8908548-1	208462
F1	Fuse: 1.5 amp, 125 v, slow blow type	8851771-18	98682
J1	Connector: male, 6 contact	727969-3	51604
J2	Connector: female, phone tip jack, red	8825451-2	207347
J3	Connector: female, phone tip jack, black	8825451-3	207348
L1, L2	Reactor: dual filter choke	476448-1	208459
P1	Connector: female, 6 contact	727969-4	51607
R1	Resistor: fixed, wire wound, 100 ohm ±10%, 10 w	8825410-30	30561
R2	Not Used		
R3	Resistor: adjustable, 1000 ohm, 10 w	889725-6	52841
R4	Resistor: fixed, composition, 22 ohm ±10%, 1/2 w	82283-42	502022
R5	Resistor: variable, wire wound, 30 ohm, 4 w	746088-9	59934
R6	Resistor: fixed, composition, 33 ohm ±10%, 1 w	90496-44	512033
R7	Resistor: adjustable, 1000 ohm, 10 w	889725-6	52841
R8	Resistor: adjustable, 1500 ohm, 10 w	427491-54	47051
S1	Switch: toggle, D. P. D. T.	95559-5	93263
SR1	Rectifier: selenium	8908546-1	208464
SR2	Rectifier: selenium	8908547-1	208463
T1	Reactor: saturable core	476447-1	208460
T2	Transformer: power	476455-1	208461
XF1	Holder: fuse	844027-2	45851

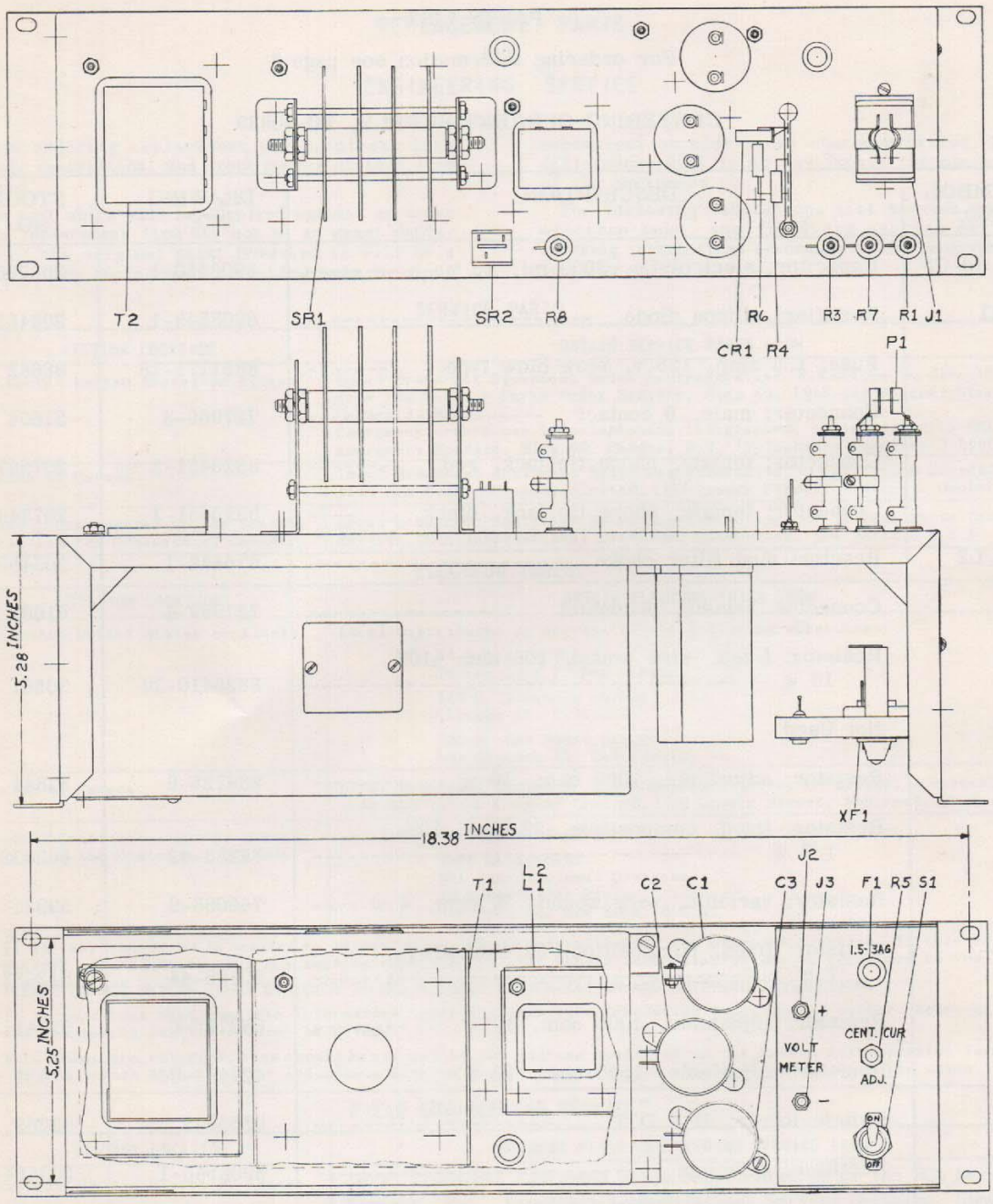
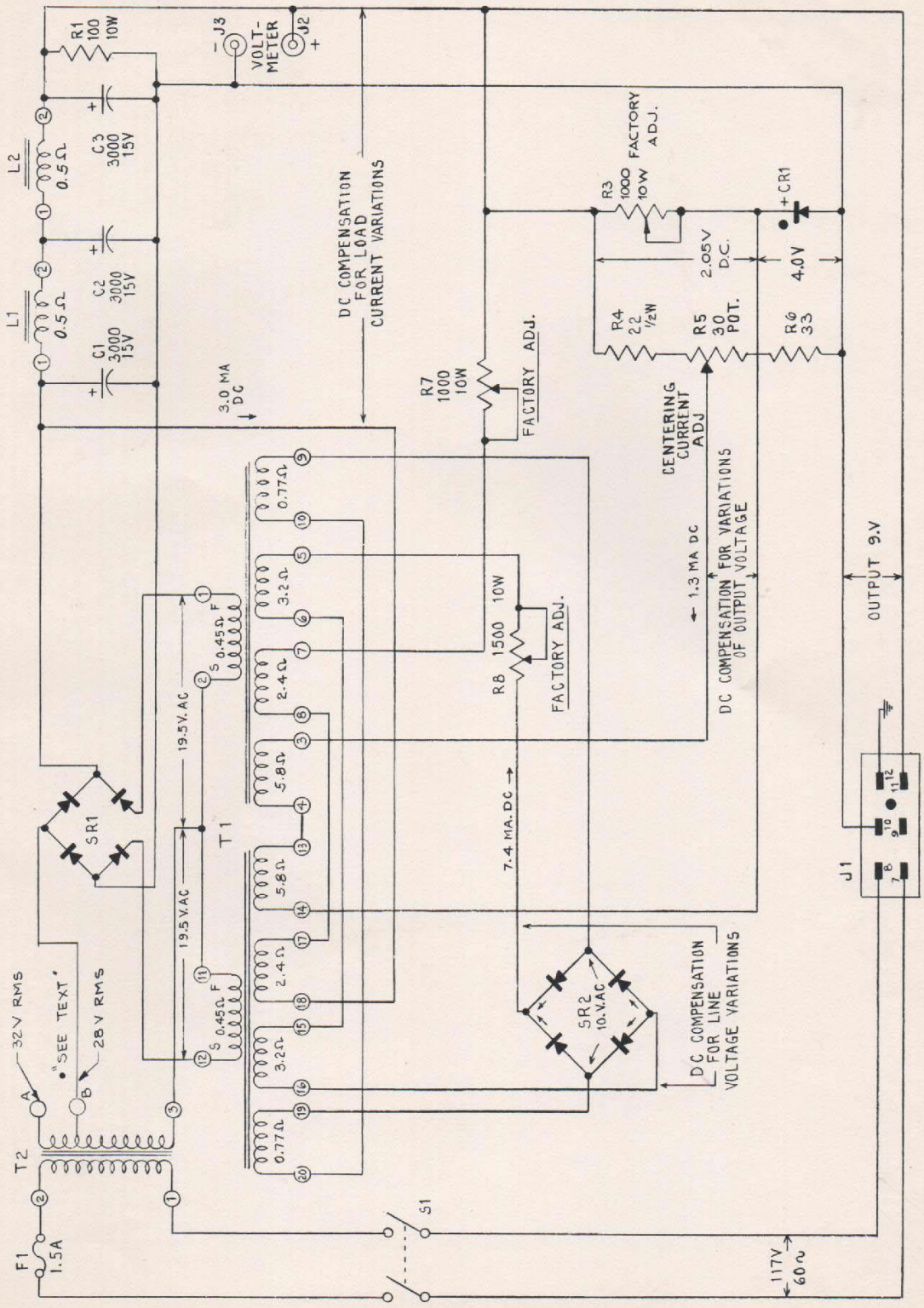


Figure 1 - Outline Drawing, Centering Current Supply (637024, sub 1)



ALL RESISTOR VALUES IN OHMS - 1 WATT - 10% TOL. AND ALL CAPACITORS IN MICRO-FARADS UNLESS OTHERWISE NOTED.
ALL VOLTAGE AND CURRENT READINGS WERE TAKEN AT 1.5 A. DC LOAD

Figure 2 - Schematic Diagram, Centering Current Supply (754322, sub 2)

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